

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/17/09 has been entered. Claims 1-21 are currently under examination on the merits. The previous 112 rejections have been withdrawn as a result of applicant's amendments.

Examiner's Note

2. The use of produce-by-process limitations has been noted in claim 1, such as, for example, "electrospun." Even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself. In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). As the court stated in Thorpe, 777 F.2d at 697, 227 USPQ at 966 (The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.).

Claim Rejections - 35 USC § 112

3. Claims 1-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

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art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites that an optical precursor is incorporated into the electrospinning solution. There is insufficient support for this limitation in the specification.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites that an optical material is incorporated into the electrospinning solution and then later recites that an optical material is coated or doped on the already formed (i.e. derived) fiber. It is therefore vague and indefinite if there is an implicit requirement for two optical materials, one in the fiber before it is formed and one after it is formed.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-5, 7, 8 and 15-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein et al. (U.S. 5,356,487) in view of Dzenis et al. (U.S. 6,265,333) and further in view of Sennet et al. (U.S. 2002/0096246).

10. Regarding claim 1, Goldstein et al. discloses a high surface areas (i.e. small diameter) carbonized fiber containing rare earth oxides (optically active in the IR spectra) having a nanometer scale diameter (i.e. less than 1 micron) (C5, L5-C6, L15). Goldstein et al. does not disclose electrospinning as a method of making the polymeric fibers which are later carbonized although he does disclose that the fibers are advantageously as small as possible in order to more rapidly heat and cool the fibers when used in the thermovoltaic device (C1, L30-45 and C5, L55-60). Dzenis et al. discloses that electrospinning is a method of producing polymeric fibers at extremely small diameters (C8, L10-C9, L40). Hence it would have been obvious to have used electrospinning, as taught by Dzenis et al., to produce the polymeric fibers of Goldstein et al. While Goldstein et al. discloses using optical precursors (nitrates of a desired oxide e.g. aluminum nitrate to form aluminum oxide) to be converted into the desired optical oxides during the carbonization step (C5, L50-C6, L15) the reference does not explicitly disclose that the

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precursors be incorporated into the polymeric solution of the fiber (rather they are disclosed as being impregnated into the fiber after it is formed). Sennet et al. discloses that it was known to incorporate (i.e. dope) additives, including reactive compounds and catalysts, into the polymeric solution prior to the actual forming of the fiber ([0031]). Hence it would have been obvious to have incorporated the nitrates of Goldstein et al. into the polymeric solution prior to the formation of the fibers because it would eliminate the extra step of impregnating the fibers after they are formed and therefore reduce the cost to manufacture the fibers.

Regarding claims 2-5, 7, 8 and 15-21, Goldstein discloses all of the limitations as set forth above. Additionally, Goldstein et al. discloses that the fiber is carbonized (C6, L5-15) and that it contain ytterbia and erbium (C5, L60-65). The fiber is also disclosed as containing silica (C5, L10-15). Erbium oxide produces colors in the near IR spectrum and the amounts used produce a noticeable emittance of radiation (C1, L30-45). The use of the rare-earth fiber is with other fibers in a composite structure (i.e. fabric) (See Fig. 2A and 2B) for energy conversion in a thermophotovoltaic device ((C1, L30-45, thermal energy is converted to photovoltaic energy). The emission of infrared radiation as a result of exposure to combustion (C1, L30-45) makes the device a chemical sensor in that it senses combustion.

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein et al. (U.S. 5,356,487) in view of Dzenis et al. (U.S. 6,265,333) and further in view of Sennet et al. (U.S. 2002/0096246) as applied to claim 1 above, and further in view of Tatarchuk et al. (U.S. 5,102,745).

Regarding claim 6, modified Goldstein et al. discloses all of the limitations as set forth above. Goldstein et al. does not disclose the inclusion of a catalyst within the fiber composite.

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Tatarchuk et al. discloses that it was known in the art to provide catalyst particles within multifiber composite networks (See abstract) due to the flexibility and low pressure drop of the catalyst containing fiber composite structure as compared to a packed bed structure (C10, L45-65).

The inventions of both modified Goldstein et al. and Tatarchuk et al. are drawn to the field of multifiber composite networks and therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the fiber composite of modified Goldstein et al. by adding catalysts as taught by Tatarchuk et al. for the purposes of utilizing the structure as a flexible catalyst support.

12. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein et al. (U.S. 5,356,487) in view of Dzenis et al. (U.S. 6,265,333) and further in view of Sennet et al. (U.S. 2002/0096246) as applied to claim 1 above, and further in view of Milstein et al. (U.S. 5,601,661)

Regarding claim 9-14, modified Goldstein et al. discloses all of the limitations as set forth above. Additionally, modified Goldstein et al. discloses altering the amount of rare earth metal oxide in the overall composite from between 1-99 wt%. Rose et al. does not specifically disclose the amounts of rare earth metal in the infrared functional fibers.

Milstein et al. discloses that the composition in a mixture of a base oxide (aluminum oxide) and a rare earth oxide (ytterbium) can be altered between 0% ytterbium and 90% ytterbium (C3, L40-C4, L20), which completely overlap the claimed ranges. Milstein et al. discloses that relative amounts of rare earth metal to base material effect the thermophotovoltaic properties, as well as the mechanical strength properties of the composition (C4, L1-20).

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The inventions of both modified Goldstein et al. and Milstein et al. are drawn to the field of thermophotovoltaic compositions and therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the amount of rare earth metal in the optically functional nanofibers of modified Goldstein et al. as taught by Milstein et al. for the purposes of optimizing the thermophotovoltaic and mechanical strength properties.

13. Claims 1 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dzenis et al. (U.S. 6,265,333) in view of Elbert et al. (U.S. 3,565,910),

14. Regarding claims 1 and 21, Dzenis et al. discloses electrospun nanofibers made of, inter alia, nylon (C8, L10-45) for use in composites resistant to environmental conditions (C1, L20-25). Dzenis et al. does not disclose that optical materials be doped into the solution before electrospinning however, Elbert et al. discloses a nylon composition containing pigments which would be beneficial for use as the base material for the electrospun polymer of Dzenis et al. because of its heat and light stabilized properties (i.e. environmental stability). The composition of Elbert et al. is disclosed as containing carbon black in order to adjust the shading of the color (C5, L65-C6, L5). The inventions of both Dzenis et al. and Elbert et al. are directed towards environmentally stable compositions and therefore it would have been obvious to one having ordinary skill in the art to have adjusted the nylon polymer of Dzenis et al. by using the stabilized nylon composition of Elbert et al. for the purposes of imparting increased environmental stability.

Response to Arguments

15. Applicant's arguments filed on 08/17/09 are considered moot in light of the new grounds of rejection provided above which were necessitated by applicant's amendments.

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Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL B. NELSON whose telephone number is (571) 270-3877. The examiner can normally be reached on Monday through Thursday 6AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571) 272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/
Supervisory Patent Examiner, Art Unit 1794

/MN/
09/10/09